

4.16a

Solving Logarithmic Equations

Name _____ Date _____ Period _____

Find the exact solution algebraically, and check it by substituting into the original equation. Show work!

1. $32\left(\frac{1}{4}\right)^{x/3} = 2$

2. $36\left(\frac{1}{3}\right)^{x/5} = 4$

3. $3 \cdot 4^{x/2} = 96$

4. $2 \cdot 5^{x/4} = 250$

5. $3(5^{-x/4}) = 15$

6. $2(10^{-x/3}) = 20$

7. $\log_2 x = 5$

8. $\log x = 3$

9. $\log_4(1-x) = 1$

10. $\log_4(x-5) = -1$

Solve each equation. If necessary, obtain a numerical approximation for your solution by rounding to the nearest ten thousandths. Check your solution by substituting into the original equation. Show work!

11. $1.08^x = 6.45$

12. $0.95^x = 1.3$

13. $40e^{0.025x} = 200$

$$14. \quad 90e^{0.035x} = 360$$

$$15. \quad 3 + 2e^{-x} = 11$$

$$16. \quad 7 - 4e^{-x} = -5$$

$$17. \quad e^{3x} = 10$$

$$18. \quad 4e^{(x+1)} = 5$$

$$19. \quad 3^x = 25$$

$$20. \quad 5^{x+3} = 30$$

$$21. \quad 4^{5-x} - 2 = 13$$

$$22. \quad 2^{-x} = 3.5$$

$$23. \quad 9^{(x-4)} + 2 = 5$$

$$24. \quad \ln x^2 = 6$$

$$26. \quad \log x^2 = 4$$

$$27. \quad \log_3(x+2) = 2$$

$$28. \quad 3\ln(x-2) + 6 = 7$$

$$29. \quad 3 - \log(x+3) = 4$$

$$30. \log_3 x = \log_3 7$$

$$31. \log_5 x = \log_5 (2x - 3)$$

$$32. \log_2 (2x + 1) = 5$$

$$33. \log_3 (3x - 2) = 3$$

$$34. \log_2 (x+2) + \log_2 (x+4) = 3$$

$$35. \log_{10} x + \log_{10} (x + 21) = 2$$

$$36. \log_3 (5x + 5) - \log_3 (x^2 - 1) = 0$$

$$37. 2\log_3 (x+4) - \log_3 9 = 2$$

$$38. 5\log_3 (x + 1) - \log_3 27 = 2$$

$$39. 3\log_2 (x - 4) + \log_2 32 = 17$$

$$40. \log_9 5 + \log_9 (n + 1) = \log_9 6n$$

$$41. \log_3 2 + \log_3 8 = \log_3 2x$$

$$42. \log_5 42 - \log_5 7 = \log_5 (3x - 1)$$

State the domain of each function. Then match the function with its graph.

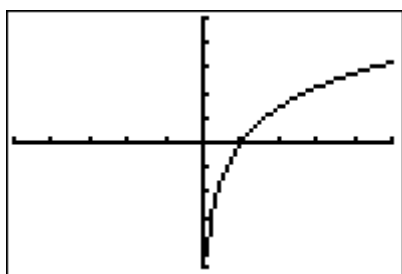
(Graph windows [-5, 5] by [-5, 5].)

$$43. f(x) = \log[x(x+1)]$$

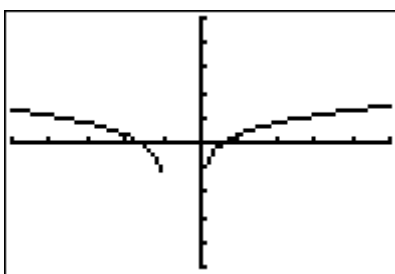
$$44. f(x) = \ln \frac{x}{x+1}$$

$$45. f(x) = 2 \ln x$$

a)



b)



c)

